eyeheight

legalEyesHDi

legalEyesHDi(LEHD) & legalEyesHDiF(LEHDF)
20/06/07 - v1.01

user manual

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1 System Overview

The legalEyesHDi is a full-featured Legaliser system using the eyeheight evolutionDT platform. The main features of the legalEyesHDi series of legalisers are as follows:

- Provides Legalisation of the HD-SDI Input signal with full 10 bit processing throughout.
- Two Independent HD-SDI outputs for "Legalise" and user controllable "Raw/Legal/Indicate" (legalEyesHDiF only)
- Indicate mode can show different colours for R,G and B components which are processed (legalEyesHDiF only).
- Adjustable Clipping Levels.
- Adjustable soft clipping knee levels.
- Highly effective overshoot and undershoot suppression on the luminance signal.
- Analog blanking generator.
- Integral luma and chroma gain, black level adjustment & hue rotation.
- EBU 2003 standard legalisation settings.
- 24Hz, 25Hz, 30Hz 1920x1080 interlaced/progressive and 24Hz, 25Hz, 30Hz, 50Hz, 60Hz 1280x720p inputs – auto sensing
- 6 User Memories.

1.1 Legaliser Processing

A Block diagram of the legaliser is shown below. The HD-SDI Input firstly goes to the Proc Amp Section. This enables the Luma gain to be adjusted from 0 to 200%, Similarly the chroma also is adjustable from 0 to 200%. Full 10 bit by 10 bit Multipliers are used with a rounded 10 bit product. Black level adjustment is also applied at this point as is hue adjustment which allows for ±180° of hue rotation. These controls are accessed via the “Picture” menu.

The next section is a cropping or blanking generator that is accessed from the “Utils” menu.

After the crop is the legaliser, which consists of a colour space conversion from Y,Cr,Cb to R,G,B. This first conversion then enters the RGB Clip unit. This has three purposes:

To Clip, and therefore legalise the incoming signal.

To provide a signal that indicates that a particular part of the signal is legal or illegal ("Not in clip", or "In clip").

To provide information to a "Colour Field Generator" (Not shown) to show parts of the picture that have been modified by the legaliser on the HD-SDI Output.

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The Clipping section consists of a 10 bit RAM Look Up Table. This

Enables hard and soft clipping tables to be loaded into the RAM.

The legaliser section has a switch that either selects the fully bypassed input signal, or the "Clipped" or "Legalised" signal. Any signal that is within the specified RGB Legal parameters will pass through the unit transparently. When the unit senses that it is in an "Illegal" part of the signal, it will switch in its processing to output the Clipped (Modified) part of the signal.

The Overshoot and undershoot suppression is employed here. This basically will correct for very fast (Non aliased) edges. These edges will cause the signal, when passed through a 601 Filter to overshoot and undershoot. The "Over-Kill" System predicts these overshoots and undershoots and will "Soften out" ONLY the fast edges that may cause the luminance signal to go outside the legally defined specifications. (As defined by the Low and High Clip Menus). This actually as well as keeping the signal legal also can enhance the look of poorly aliased graphics.

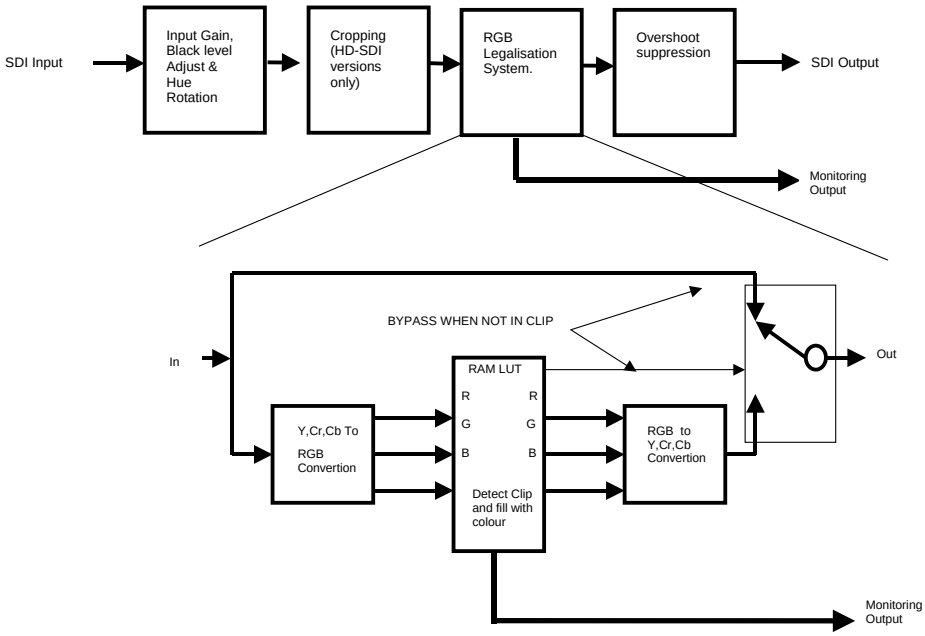

Figure 1-1 Legaliser Block Diagram.

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2 Installation

2.1 Connections to a legalEyesHDi

The diagram below shows the typical connections to the legalEyesHDi.

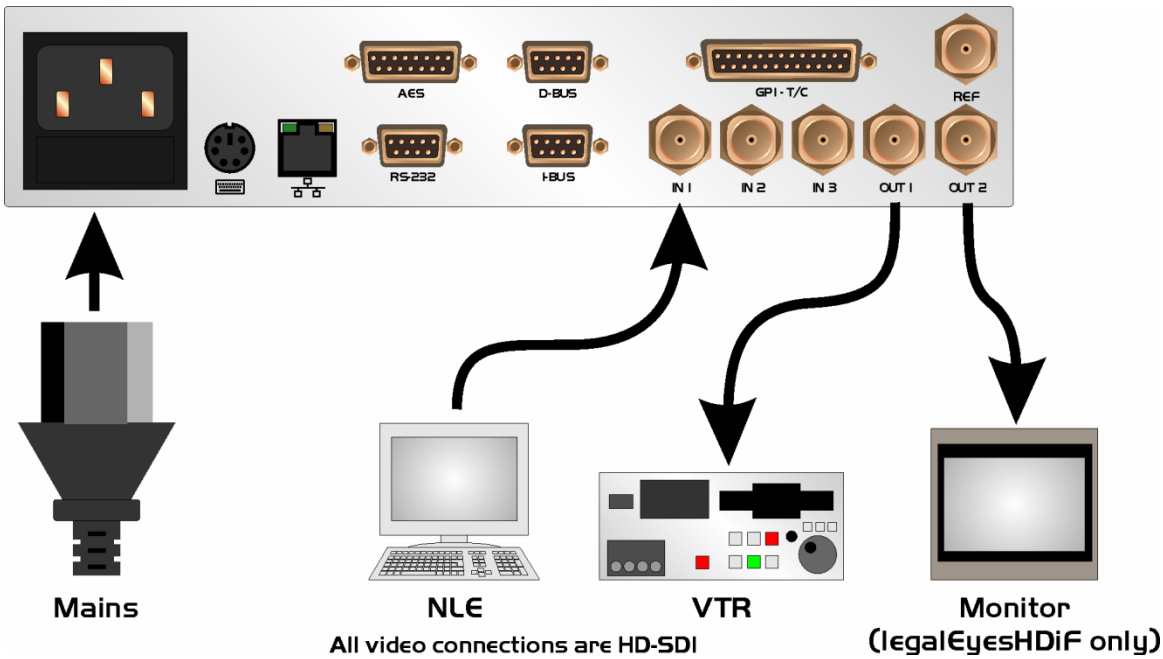

Figure 2 - Typical Connections

IN1 is the HD-SDI input. OUT1 is the main HD-SDI legalised output. OUT2 is the HD-SDI monitoring output (legalEyesHDiF only) which can be switched to show either the unlegalised output, the legalised output or the indicate display.

2.2 Associated Equipment for the legalEyesHDi

The legalEyesHDi in the evolutionDT platform is fully self-contained. The evolutionDT can optionally be rack mounted in with 1 or 2 units in a 19” rack using the optional FF-6 rack mounting. This is a factory-installed option and should be ordered with the product. Rack mounted units should be supported with suitable chassis supports.

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3 Control Panel

Figure 3 shows the control panel of the evolutionDT platform.

1 - Power/Status LED

Green – Normal operation
Green Flashing – Version Information Display
Orange – Product is initialising
Flashing Red – Product is in Field Reprogramming Mode

2 - Menu Display/Button (1 of 4)

Displays Menu Information. The colour of the menu button indicates the function.

Green – adjustment menu. Pressing the menu or using the associated digipot(6) will adjust the menu value.

Yellow – information menu, no adjustment possible.

Blue – navigation menu. Pressing the button will take you up or down the menu hierarchy.

Red – multiple variable menu. Pressing the button will “open” the menu assigning one digipot(6) to each variable. The active LED(5) will light above the digipots associated with each variable.

3 - Next Menu Button

Within a layer of the menu hierarchy there may be more than four menus and where this is the case the “next” button will illuminate to show that further menus are available. Pressing the “next” button moves you to the next set of menus.

4 – Previous Menu Button

Within a layer of the menu hierarchy there may be more than four menus and where this is the case the “prev” button will illuminate to show that previous menus are available. Pressing the “prev” button moves you to the previous set of menus.

5 – Digipot Active LED (1 of 4)

Illuminates to indicate that the digipot below is active for adjustment of the associated menu variable.

6 – Digipot (1 of 4)

Allows for rapid adjustment of the associated menu variable. Pressing a digipots returns the associated variable to its default value.

7 – Next Device Button

It is possible to control more than one device from a single evolutionDT control panel. Where more than one device is assigned to the panel the “next dev” will move control to the next device in the device list.

In setup mode this button will pick up a free device and assign it to this panels device list. The button will flash to indicate that a free device is selected.

8 – Previous Device Button

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Where more than one device is assigned to the panel the “prev dev” will move control to the previous device in the device list.

In setup mode this button will remove a device owned by this panel from this panels device list. The button will flash to indicate an owned device is selected.

9 – Info Button

This button displays all hardware, software and firmware version information for the currently selected product and this panel.

In setup mode where a free evolutionDT device is selected this button will flash indicating that the network address (box & slot) can be changed. Pressing this button will take you to the adjustment menus.

10 – Setup Button

Press and hold this button for four seconds to enter setup mode.

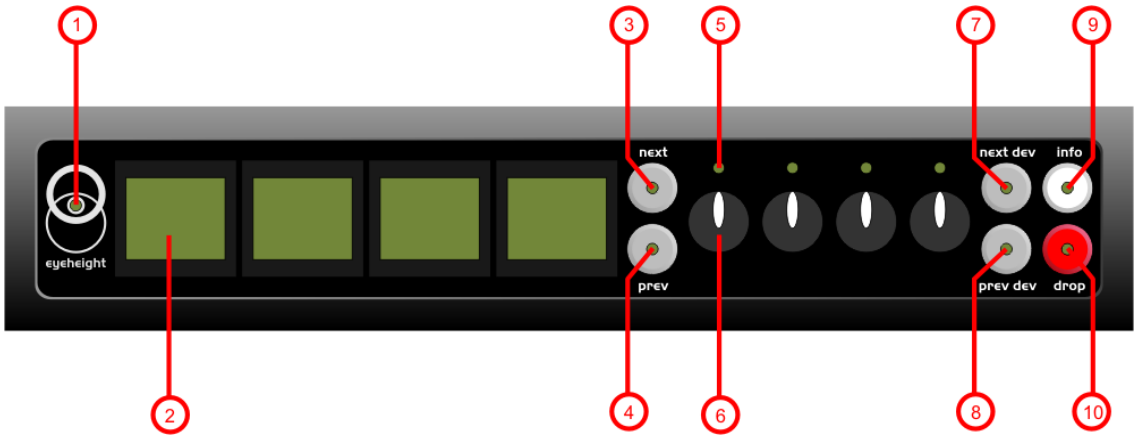

Figure 3 - evolutionDT Control Panel

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4 Operation

4.1 Manual control of the legalEyesHDi

The legalEyesHDi is controlled using a set of MENUS. Each of these menus contains up to 3 parameters that are adjusted using the rotary digipots. The Menus define all of the adjustable operational parameters in the legalEyesHDi.

See chapter 3 Control Panel Operation for details of the control panel operation.

See section 3 of this chapter for the full list of menus.

4.2 Automation Control of the legalEyesHDi

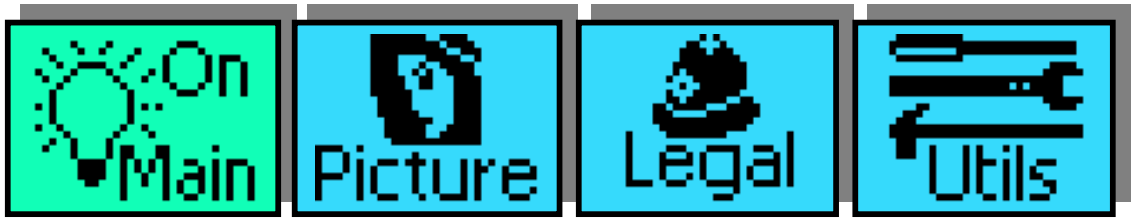
Automation of the evolutionDT products is achieved either via the RS232 port (currently not implemented) or via the I-Bus Port using an optional DG-9 (RS232 to I-Bus dongle). Automation control of the legalEyesHDi is performed using the geNETics Automation Protocol.

Genetics protocol is described in detail in the “geNETics User Guide” section titled “Automation Protocol on the geNETics Platform”. The menu list in section 3 of this chapter contains the data information for the protocol.

Please refer to the “User guide for the DG-9 eyeheight dongle and set-up software.

4.3 Operational Menus for the legalEyesHDi

Menu 00-03: Top Level Menus



Menu Num.	Heading	Automation	Function
00	System ON or OFF	Off On [0→1]	This will switch in and out the system as a whole, effectively putting it into bypass mode.

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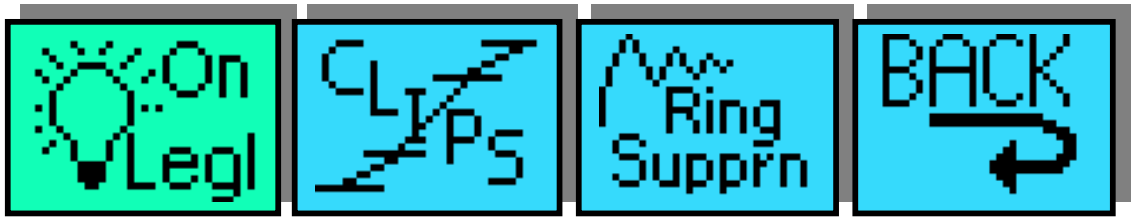
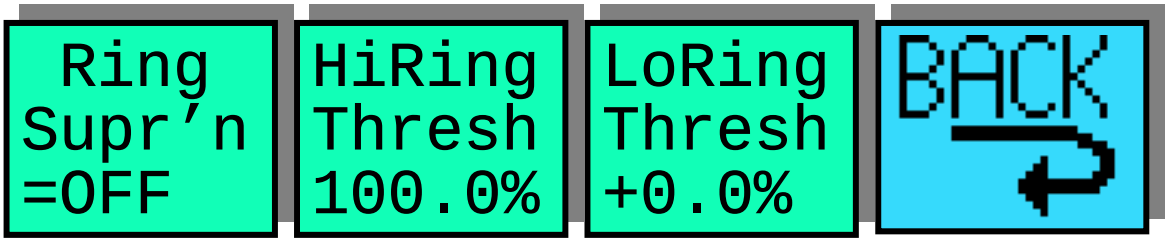
01	PICTURE	none	Go To the main Picture menus (24-27)
02	LEGALISE	none	Go To the main Legaliser menus (4-7)
03	UTILITIES	none	Go To the main Utility menus (36-39)

Menu 04-07: Legaliser Menus



Menu Num.	Heading	Automation	Function
04	Legaliser Status.	On Off [0→1]	This shows the status of the Legaliser block only. (NOT the Proc amp (Input Gain) or the Overshoot suppression. On=ON, Legaliser is active Off=OFF, Legaliser is in Bypass
05	CLIPS	none	Go To the Hi and Lo Clipping menus (12-15)
06	RING	none	Go To the Ring Suppression menus (8-11)
07	BACK	none	Go To the main menus (0-4)

Menu 08-11: Ring control menus



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Menu Num.	Heading	Automation	Function
08	Ring Suppression Mode	Off Auto Manual [0→2]	Off= No overshoot or undershoot suppression is employed Auto= The Overshoot and Undershoot suppresser automatically tracks the Settings for the High and Low clip on the Legaliser section. Manual= The user can set the High and low Ring suppression thresholds manually.
09	High Ring Suppression Threshold	51% → 109% [512→1023]	When "Ring Suppression" Mode is in "Manual". This menu allows the user to set the upper limit at which no luma signal can go beyond, whether this is due to its absolute level, or its achievable level as an overshoot or undershoot on a 601 filter.
10	Low Ring Suppression Threshold	-8%→ 50% [0→511]	When "Ring Suppression" Mode is in "Manual". This menu allows the user to set the lower limit at which no luma signal can go below, whether this is due to its absolute level, or its achievable level as an overshoot or undershoot on a 601 filter.
11	BACK	none	Go To the Legaliser menus (4-7)

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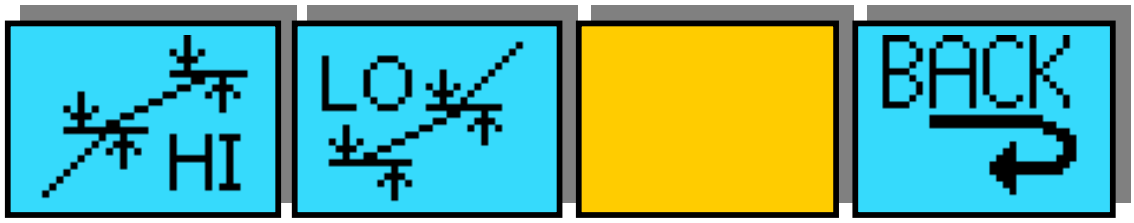
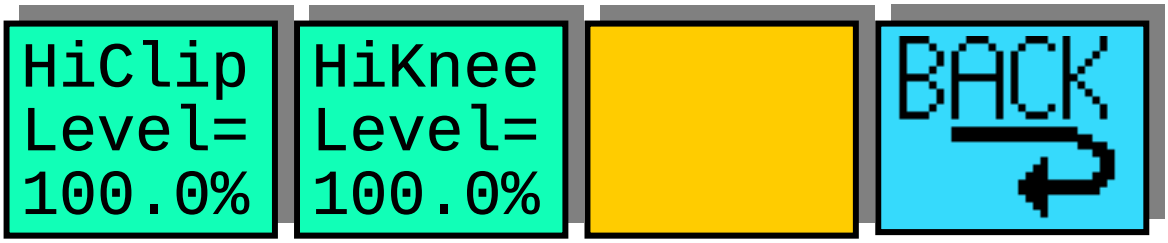
Menu 12-15: Legaliser Clip and Knee Menus



Menu Num.	Heading	Automation	Function
12	Hi	none	Go To the Hi Clip and Hi Knee Clipping menus (16-19)
13	Lo	none	Go To the Lo Clip and Lo Knee Clipping menus (20-23)
14		none	Blank
15	BACK	none	Go To the main menus (4-7)

Menus 16-19: Legaliser High Clip and Knee settings



Menu Num.	Heading	Automation	Function
16	High Clip Level	51% → 109% [512→1023]	This indicates the High Clip point for the RGB Clipping. This is normally set to 100% for clipping at 0.7V in the analogue domain.
17	High Knee Level	51% → 109% [512→1023]	This indicates the High Knee point for the RGB Clipping. This can be set to give a “soft clip” from this knee point to the hard clip point.
18		none	Blank
19	BACK	none	Go To the main menus (12-15)

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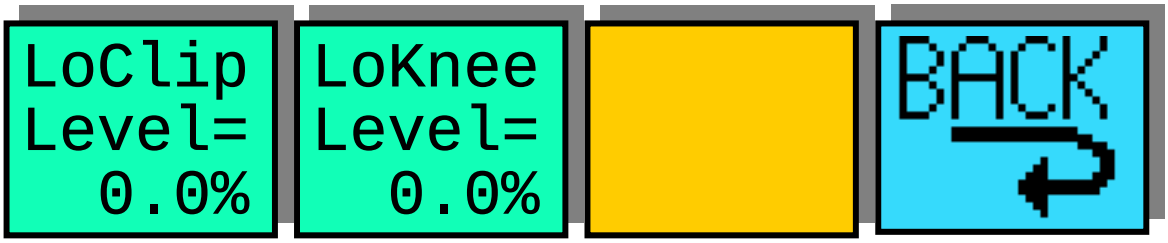
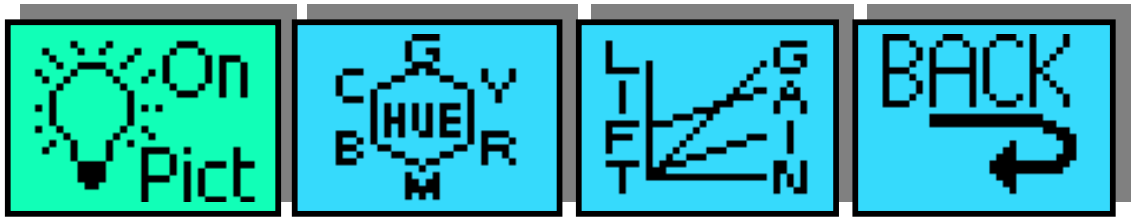
Menu 20-23: Legaliser Low Clip and Knee Settings



Menu Num.	Heading	Automation	Function
20	Low Clip Level	-7%→ 50% [1→511]	This indicates the Low Clip point for the RGB Clipping. This is normally set to 0% for clipping at 0V in the analogue domain.
21	Low Knee Level	-7%→ 50% [1→511]	This indicates the Low Knee point for the RGB Clipping. This can be set to give a “soft clip” from this knee point to the Low clip point.
22		none	Blank
23	BACK	none	Go To the main menus (12-15)

Menu 24-27: Processing Amplifier Menus



Menu Num.	Heading	Automation	Function
24	Lift, Gain, Hue and Black Control	On Off [0→1]	Active=Proc amp is processing, gain, hue and black controls are active Bypass= Unity Gain and no black offset.
25	HUE	none	Go To the Hue menus (28-31)
26	LIFT/GAIN	none	Go To the Luma, Chroma and Black menus (32-35)
27	BACK	none	Go To the main menus (0-4)

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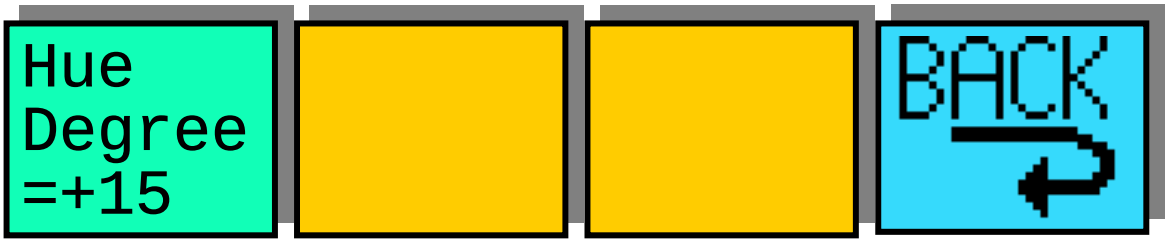
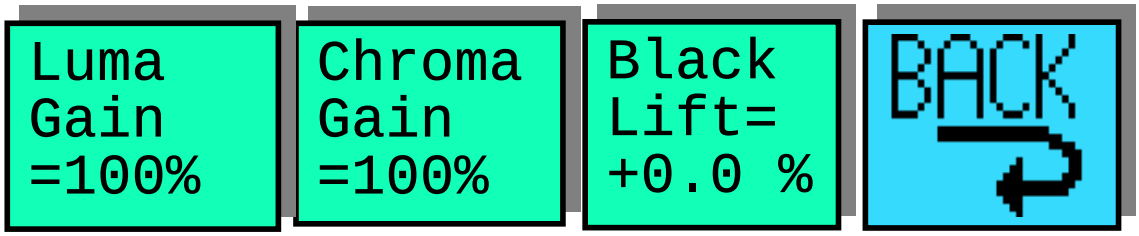
Menu 28-31: Hue Control



Menu Num.	Heading	Automation	Function
28	Hue	-180 to +180 degrees [-511 →+512]	Hue Rotation value, in degees.
29		none	Blank
30		none	Blank
31	BACK	none	Go To the Picture menus (24-27)

Menus 32-35: Processing amplifier status.



Menu Num.	Heading	Automation	Function
32	Luma Gain	0→200% [0→511]	Luminance Gain Adjustment
33	Chroma Gain	0→200% [0→511]	Chrominance Gain Adjustment
34	Black Level	+/- 20% Range [-255→255]	Black level adjustment
35	BACK	none	Go To the Picture menus (24-27)

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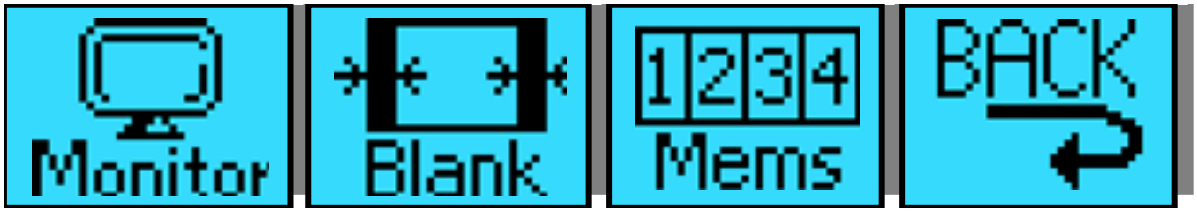
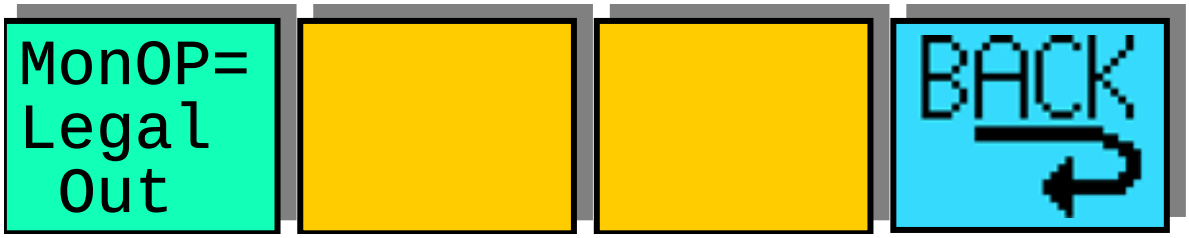
Menus 36-39: Utility Menus



Menu Num.	Heading	Automation	Function
36	MONITOR	none	Go To the Out of Gamut Colour menus (40-43)
37	BLANK	none	Go To the Crop menus (44-47)
38	MEMS	none	Go To the Memory and Software menus (48-71)
39	BACK	none	Go To the main menus (0-4)

Menus 40-43: Out of Gamut Colour



Menu Num.	Heading	Automation	Function
40	MonOp	LegalOut RawOut ShowRGBerr* BlueSteady* RedSteady* GreenSteady* WhiteSteady* FlashRGBerr* BlueFlash* RedFlash* GreenFlash* WhiteFlash* [0→11]	This menu selects the function of the second output. “LegalOut” gives a second legalised output. “RawOut” passes bypasses the legaliser to the second output. The other option select the colours used to indigate which pixels are being processed byt the legaliser. RGB Modes will individually indicate the Red, Green and Blue parts of the signal that are modified by the legaliser using a corresponding fill colour. *These options are only available on the LEHDF and LEMDF
41		none	Blank
42		none	Blank
43	BACK	none	Go To the Utils menus (36-39)

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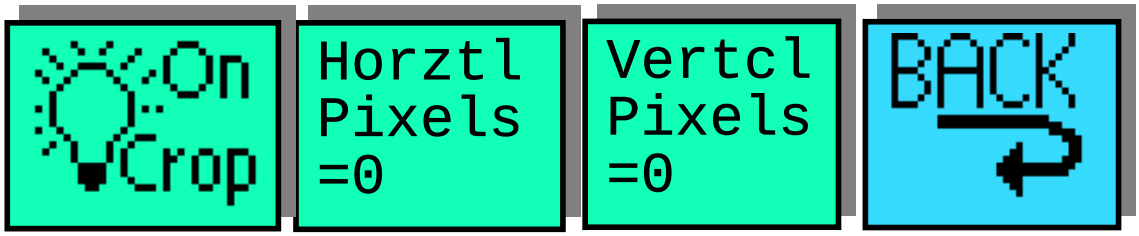
Menus 44-47: Crop Settings



Menu Num.	Heading	Automation	Function
44	CROP	On Off [0→1]	Active=Element Cage is processing Picture will be cropped according to the Horizontal and Vertical Pixel settings
45	HORIZONTAL PIXELS	0→960 [0→960]	Left and Right crop
46	VERTICAL PIXELS	0→540 0→540]	Top and Bottom crop
47	BACK	none	Go To the Utils menus (36-39)

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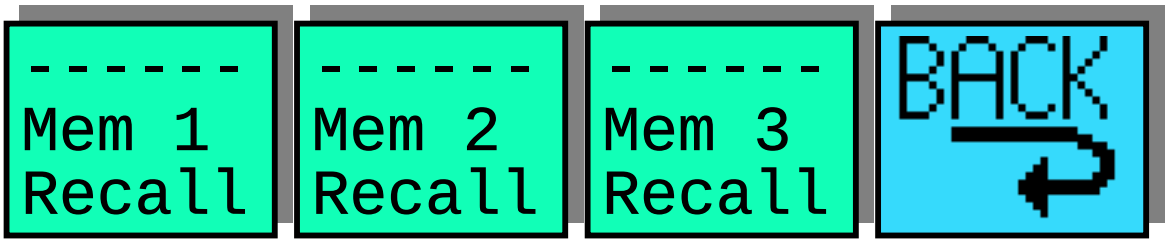
Menus 48–51: Memory Controls



Menu Num.	Heading	Automation	Function
48	MEM1	1=Recall (Variable 1)	Pressing this will recall Memory number 1.User Names can be programmed in to the memories using a keyboard. See “geNETics User guide”, section “Giving product Memories names”
49	MEM2	1=Recall (Variable 1)	Pressing this will recall Memory number 2.
50	MEM3	1=Recall (Variable 1)	Pressing this will recall Memory number 3.
51	BACK	none	Go To the Utils menus (36-39)

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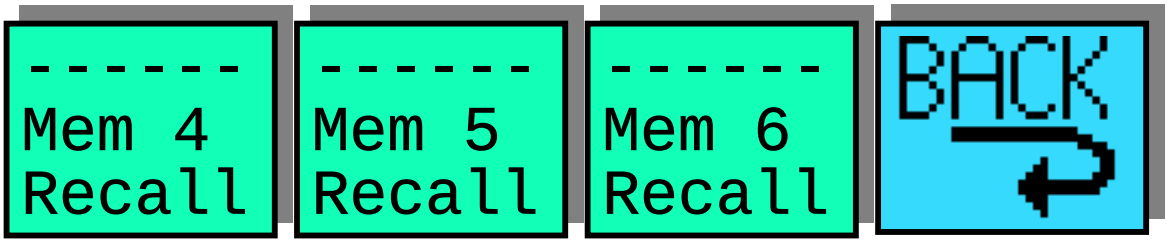
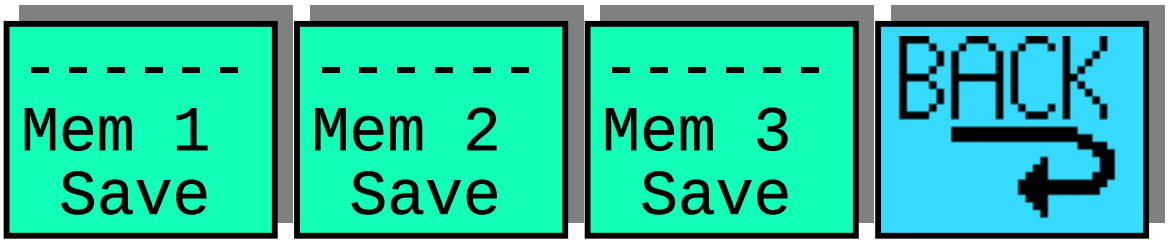
Menus 52-53: Memory Controls



Menu Num.	Heading	Automation	Function
52	MEM4	1=Recall (Variable 1)	Pressing this will recall Memory number 4.
53	MEM5	1=Recall (Variable 1)	Pressing this will recall Memory number 5.
54	MEM6	1=Recall (Variable 1)	Pressing this will recall Memory number 6.
55	BACK	none	Go To the Utils menus (36-39)

Menu 56-59: Memory Controls



Menu Num.	Heading	Automation	Function
56	Save Mem. #1	1= Save	Pressing this will Save Memory number 1.
57	Save Mem. #	1= Save	Pressing this will Save Memory number 2.
58	Save Mem. #3	1= Save	Pressing this will Save Memory number 3.
59	BACK	none	Go To the Utils menus (36-39)

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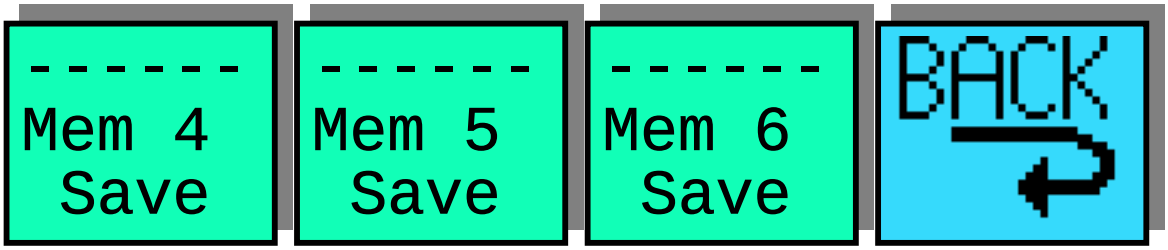
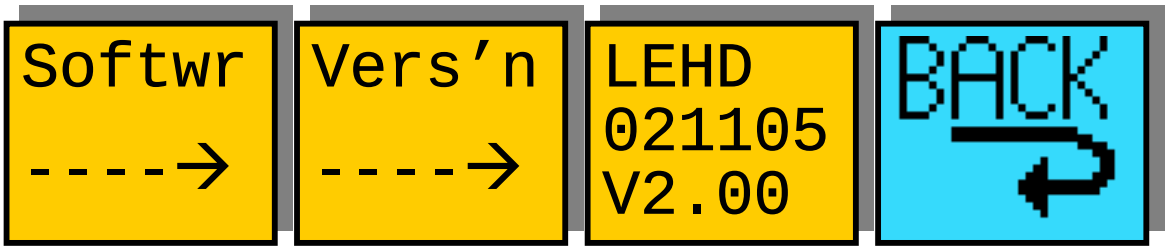
Menu 60-63: Memory Controls



Menu Num.	Heading	Automation	Function
60	Save Mem. #5	1= Save	Pressing this will Save Memory number 4.
61	Save Mem. #6	1= Save	Pressing this will Save Memory number 5.
62	Save Mem. #7	1= Save	Pressing this will Save Memory number 6.
63	BACK	none	Go To the Utils menus (36-39)

Menu 64-67: Software Version



Menu Num.	Heading	Automation	Function
64		none	Blank
65		none	Blank
66	Software Version	N/A	Shows the current software version
67	BACK	none	Go To the Utils menus (36-39)

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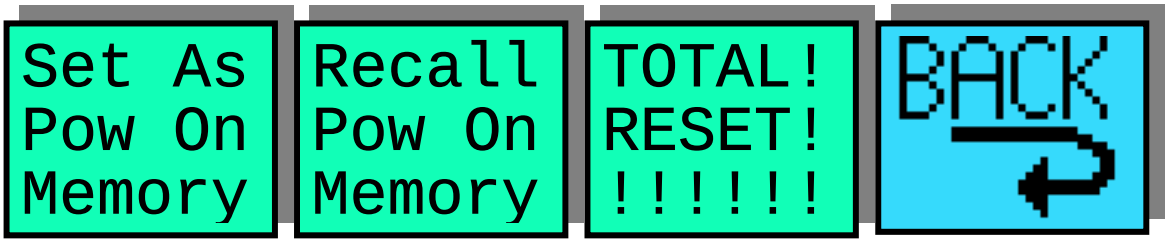
Menu 68-71: Power-on & Reset Controls



Menu Num.	Heading	Automation	Function
68	Set As Pow On Memory	1=save	Pressing this will save the current set up as the power on default.
69	Recall Pow On Memory	1=Recall	Pressing this will recall the power on default settings.
70	TOTAL RESET	1=Reset	Pressing this will reset the system.
71	BACK	none	Go To the Utils menus (36-39)

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Appendices

4.4 Appendix 4, technical specification

HD-SDI Inputs 1485Mbit, 75ohm	1 input (HD-SDI)
HD-SDI cable equalisation	At least 100 Meters of Belden 1694A
HD-SDI Outputs. 1485Mbit, 75ohm, 800mV.	1 or 2 (F and S models only have 2 Outputs) output (HD-SDI)
GPI Inputs. (activate by short to ground)	none
Tally Outputs	none
Control System connections.	eyeheight I-Bus, 2 wire network.
Control Surfaces	Option of 2 eyeheight control surfaces. Integral front mounted contol panel or remote FP-9, flexipanel.
Chassis	Eyeheight evolution miniBox chassis. Either a half width 1RU assembly for desk mounting or a full 1RU assembly for 19 inch rack mounting.
Line Standards	1080-23.98psf, 1080-24psf, 1080-23.98p, 1080-24p, 1080-25p, 1080-50i, 1080-29.97p, 1080-30p, 1080-59.94i, 1080-60i, 720p-23.98, 720p-24, 720p-25, 720p-29.97, 720p30, 720p50, 720p59.94, 720p60
Power supply	100→240V ac. Less than 50W power consumption.

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